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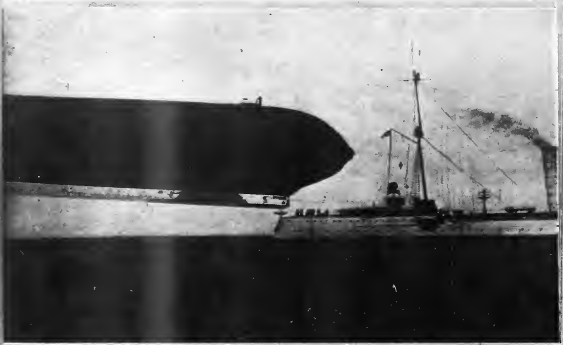

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FEBRUARY 14, 1921

AVIATION AND AIRCRAFT JOURNAL

VOL. X. NO. 7

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AVIATION
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Vol. X FEBRUARY 14, 1921 No 7

The Aircraft Controversy

IT is a heavy responsibility that those who believe in the future possibilities in warfare assume when they inject at this time their optimistic views into the capital ship discussion in Congress. The claims of General Mitchell that aircraft can put out the eyes of a fleet poorly equipped with airplane carriers, and attack and sink, all kinds of naval and commercial ships should be given the most searching investigation and demonstrations. It is unfortunate that General Mitchell's whole theory of air strategy is not more clearly understood When it is assumed that all the possible achievements of aircraft against sea and land forces can be secured with the present equipment, much of which is in the experimental stage, with small appropriations for development and protection, the conclusion reached is not General Mitchell's. Given a real Air Force under the daring leadership of our pilots, who are unexcelled in the world, real results would then be shown and the controversy taken from the state of discussion and placed on a demonstrable basis.

A letter from a valued correspondent sounds a note of caution on this subject which is proper and timely It urges everyone to "pause a long time before throwing themselves into the arms of any movement, when this movement is believed earnestly and honestly by the overwhelming majority of officers of the Army and Navy, outside of the Army Air Service, to be inimical to the interests of national defense It is a simple thing to develop any open contempt for the opinions of military officers but, in the final analysis, they devote enormously more constructive thought to the problems of national defense than do the entire mass of citizens outside of these classes. Anyone, therefore, who adopts an attitude which is directly contrary to what the majority of these officers believe in, should pause and consider carefully his position He may, of course, be correct. There have been many instances of this sort in the history of the world, but the chances are over-whelming against him In my opinion, the country which goes against the reasoned and settled convictions of its military establishments must either retrace its steps or else court unfavorable conditions when the next contest comes.

"However people who champion an independent air service may look at it, the fact remains that they are trying to override the Navy and the Army, outside the Air Service branch of that Department, in establishing something in which they thoroughly disbelieve, and to which they are whole heartedly and honestly opposed Whether this is an enterprise one desires to be engaged in must remain for him to determine, whether he feels certain enough of his ground or sure enough of the soundness of his judgment to take such an attitude without fearing that, perhaps, he may be wrong, and, therefore, acting contrary to the interests of national defense, must remain for him to speculate upon."

Such a conservative attitude is worth giving all the consideration that it should receive.

Another phase of the controversy that should be watched with great care in the "Stipulations" that will be in effect at the proposed test. It is reported that the Navy proposes to limit aircraft in their bombing operations to an altitude of ten thousand feet, this being the range of naval anti-aircraft guns. Such an absurd limitation is a reflection on the bravery of our pilots and does little credit to the imagination of the naval officers who are preparing for the test. It would be just as logical for an army to stipulate that infantry in maneuvers should not approach the front line trenches nearer than three miles as this is the range of light artillery Equally fair it would be to limit the peace time operations of submarines and torpedo boat destroyers to half a dozen miles, this being the range of a ship's secondary guns. By the use of smoke bombs or by sheer bravery our pilots may be counted on to fly without thought of personal safety directly at their objectives and if experience in the war proves anything, they would be as safe as Secretary Daniels thinks he would be on a ship bombed from ten thousand feet altitude.

Municipal Ordinances

THE decision of the Boards of Aldermen of New York and Chicago to pass air ordinances that are practically identical reflects great credit on the city fathers of both cities. By making the life of the ordinances expire when Congress passes Federal aerial laws is another wise provision.

Both ordinances as introduced are the result of the best judgment that can be secured from fliers and civilians and without being radical in any way, will safeguard the life and property of residents of the cities. The minimum altitude of two thousand feet will deter reckless pilots from foolish exhibitions over populous districts. Stunting over the cities is prohibited as it should be everywhere except over government fields or open spaces.

The enforcement of such ordinances will be difficult and it is hoped that the mere statement of what pilots may and may not do will be sufficient to make them effective. A standard municipal ordinance is a genuine achievement.

Planting Seeds

THE agricultural press as well as the popular technical magazines have given prominence to the idea of planting seeds by airplane It is planned to mark fields to be sown with lime strips thirty-six feet apart and each flight will distribute the seeds over one strip.

If pilots would take the suggestion of this idea and use their airplanes to spread seeds of aeronautical interest over the country, it would probably accomplish more to aid the cause of aviation than the seed plane would assist the farmer Every airplane that flies carries a message to all who see it. It can arouse enthusiasm for flying or it can create a fear of the air Pilots who wish to advance aeronautics will do well to keep this thought in mind while making flights.

United Air Force-Pro and Con

(Continued)

In our issue of Dec 27, 1920 an article appeared on "United Air Force—Pro and Con" which was given the following introduction:

"One of the most important questions that will come before Congress during 1921 will be the much discussed United Air Force. AVIATION AND AIRCRAFT JOURNAL has favored the creation of such a force under a separate department, but desires its readers to know both sides of the argument. In the following pages are presented first the opposition's reasons which reflect the position of many Naval officers, and second the reasons of many Army officers who favor a separate department.—ED."

On Jan. 22, we received a letter from Commander E. G. Allen, U. S. N., Aviation Intelligence officer of the Navy, with an approval to publish from Secretary Daniels, which is published herewith. Commander Allen in his last paragraph states that the part of an article favoring a United Air Force is "an example of an article written for the layman composed of half truths which will prejudice the layman against both the Army and Navy and can result in no service to either commercial or military flying." It was considered advisable at the time of publication to present both sides of the question without allowing the personal equation to enter into consideration. So that it will be clear as to the source of the information and the responsibility of the articles it is now stated that the part opposing the United Air Force was given out by Captain T. T. Craven, Director of Naval Aviation. The part criticized was written by Major Elmer Haslett, U. S. A., who won the distinguished Service Cross and the Croix de Guerre in action in the air. He received two special citations by General Pershing for conspicuous bravery. He was operations officer of the First Army Corps Air Service at Chateau-Thierry, St. Mihiel and the Argonne. The arguments were sent with the approval of Brig. Gen. Wm. Mitchell. When Commander Allen makes the gratuitous comment that he assumes because of the publications of Major Haslett's statements that we "carry no responsibility for the national defense at sea or ashore" we only refer to the experience of both officers in aviation. We are informed that Commander Allen has had no training in aviation and no previous aviation duty. At the outbreak of the war he went over as commanding officer of a yacht, and was later member of Admiral Wilson's staff. Later, he was on Admiral Sims' staff and last year he went to the Naval War College.

Admiral Sims last week made the following statement before the House Naval Affairs Committee.

"So great now is the menace of airplane attack against a fleet," Admiral Simms said, "that when our ships now under construction are completed they will be of little use in contact with another fleet unless they are adequately equipped with aircraft, and would be defeated. We have got to be equal to the air force on the other side.

"A fleet that has planes can carry out torpedo and bombing attacks at leisure. There is no doubt of the defeat of the fleet without them. We have got to put money and time behind the development of the airplane, the aerial torpedo and the airplane carrier. Nothing is so important as pushing the development of the airplane and airplane carrier."

Following Commander Allen's letter is further argument on the same subject by Brig. Gen. Mitchell, which it is hoped will be found of interest in the consideration of this subject. Army and Navy officers are invited to continue the technical discussion in Aviation and Aircraft Journal.

The third communication to be printed here on this subject is an excerpt from a special report of the General Board of the Navy on the policy of suspending the present naval program with particular reference to capital ships.—ED.

Con

By Commander E. G. Allen, U. S. N.

So much confusing matter in general statements has been printed relative to the necessity of a governmental independent air force, and advocates have conceived the method of attaining this to be the withdrawal of the air forces of the Army and Navy from their respective departments, that the indulgence of your columns is asked for this discussion of the subject.

In war one endeavors to impose one's will on an adversary. Of the many agents called into being for this purpose the chief is the use of force by the military arms of a Government. These military forces since the dawn of history have until the advent of the airplane and airship been readily divided into the forces of the Army and Navy.

The Navy by force endeavors to gain and exercise control of the sea, namely to restrict or stop the sea communications of the enemy, and to keep one's own open for sea commerce and the free passage of Army forces or expeditions.

Trade follows the cheapest route and the cheapest method of hauling. The cheapest method of hauling freights across, over or under a ship will continue to be cheaper than by air. In war time, military operations might necessitate the carrying of certain freight by submarine or aircraft, but the practical limitations will not permit relieving the economical stress of the blockaded country by these means.

Aircraft considered from a purely naval standpoint will be of use in helping to gain command and to exercise command of the sea, but, they never can be the determining factor. The big gun and large surface craft are the controlling factors in gaining command. Such craft (capital ships) combine mobility, protection and armament to the greatest extent. Supported by proper types and a team, they can operate for periods in an enemy area, securing permanent local control of this area.

The submarine and aircraft have necessitated and necessitate the protection in the surface type, both within itself, and by supporting types. The capital ships have already successfully met the submarine menace. In the same manner, anti-aircraft defense by means of armor, guns, and aircraft will be developed as the aircraft becomes a practical menace of the sea. The date aircraft have not even modified the capital design which is indicative of their practical development as offensive weapons over the sea.

Control of air or of sea areas may be local or general, and in either case permanent or temporary, or passing from one side to the other. A surface ship can occupy an area for long periods remote from its base. Its use, therefore, is applicable to securing permanent control.

Aircraft possess great mobility but can not occupy an area permanently unless close to a base defended by the guns of ships, for the artillery or infantry of an Army. Air control while specially applicable to breaking up the control of either ashore or at sea, is less applicable to keeping permanent control, and, therefore, must base behind the other arms. It is best used as an adjunct to the other arms.

Control of the sea and the exercise of it will always rest with the side which can maintain, in an area against the enemy air, surface, or sub-surface craft, surface craft with big guns no matter who has temporary control of the air or sub surface. This condition, moreover, will be the determining factor in war over, on, or under the sea so long as the freight moves in surface craft. Should freight in bulk ever move by air, air control will be the determining factor but until that condition arises the big gunned surface craft modified to meet the menace of submerged or aerial craft will dominate the sea, command and exercise control, and apply the economic force which is the reason for navies.

Such being the case and military operations necessitating a unified command in which surface craft are maintained in areas supported by variety,—destroyers, submarines, aircraft, etc., it is obvious that aircraft at sea must be a part of the operating forces at the disposal of the commanders-in-chief and the personnel and the types must be adapted and trained to meet sea conditions.

The seaman considers he has a special training and profession in which long training, drill and experience are required through a life time career. Conversely he has not assumed that he can tell other professions military or civil what their methods, tactics or strategy should be. He does not desire to encroach upon the province of the soldier or civilian as he assumes that each has a special profession. The use of a new arm such as aircraft at sea needs special types and adapting for application to the seaman's problem in securing and exercising control of the sea. Seamen and Naval commanders familiar with naval practice, strategy and tactics are necessary in aircraft used for naval purposes to properly fit in this arm with the other naval arms in developing mobile sea power.

The menace from the air is recognized by the seaman and no system is needed to emphasize its relative importance and value. As with all other new arms or weapons such as gas, smoke, tanks, tractor artillery, it will find its place and modify warfare, but not revolutionize or control it. At sea, it may modify the surface types in horizontal armor, anti-aircraft battery, and counter air defense. To date the practical development of the air menace has not even brought about this change. The air menace must be considered not in hysterical predictions of its future value but as a practical proposition of what it is and what it can do in the immediate future. As it develops the defense against it will keep pace.

The winning of a sea action depends upon a fine coordination and cooperation from a variety of types and weapons for striking the enemy. This coordination and cooperation can only be secured as the result of long training and experience from a group of indoctrinated skilled seamen imbued with the best practice in naval tactics and full of the spirit that comes from association with naval and sea traditions.

I doubt whether in the future any Admiral on the Navy list will care or dare to guarantee the national defense at sea if the naval air forces are detailed from another corps, in which, the personnel are dependent for development technically and professionally and for pay promotion upon such other corps foreign to the Navy, and, in which the material is dependent upon the decision of officials outside of the service. This responsibility for the national defense at sea is carried by officers of the Navy and it cannot be shifted.

The decision at sea is a matter of minutes compared to weeks ashore. Responsibility is more direct, disaster is always imminent and may result from mistakes or decisions of subordinates. Long association with the fleet and long training in it as a Naval officer and seaman is required to properly put correct decision and practice gained from a lifetime into an hour or two of coordination and cooperation of fighting arms preliminary to, during, and after a main action.

Even under the present conditions it is difficult to get for naval purposes, although drawing on a naval profession, proper personnel of the judgement and experience necessary into Naval Aviation. If drawing upon or if being assigned men from a corps foreign to the Navy with interest outside it, this condition would be intensified and the air forces of the Navy would be a weak link in the fleet. I am of the opinion that this condition will occur inevitably in the British service as time passes.

In the anxiety to create an air force which might be some assistance to prod the development of commercial aviation both civilians and soldiers are too prone to jump to conclusions and overreach when they become involved in a subject and profession of which they know little or nothing. Bald statements with only a partial basis in fact relative to naval matters, while impressing the layman, may result in serious injury to such a finely regulated machine as the modern fighting fleet, and thus impair seriously the national defense.

These reasons are of more importance than any of those advanced for economy, production or commercial flying which are matters for dispute and dependent in any organization upon the character of the personnel which may be in control of a United or of Separate Air Forces.

Your Editorial of 27 December entitled, "United Air Force—Pro and Con" is an example of an article written for the layman composed of half truths which will perjudice the layman against both the Army and Navy and can result in no service to either commercial or military flying. I assume you can in no sense consider yourself a judge of any problem strategical or tactical connected with the sea, navy, or the use of the fleet, and that you carry no responsibility for the national defense at sea or ashore. Such being the case no matter what your efforts for an air force, its formation is not assisted by superficial discussion of the utility or non-utility of a naval aviation force and such articles can only impair the efforts of the Navy to maintain the national defense at sea.

Pro

By Brig. Gen. William Mitchell

The opponents of a unified air force have worked along very similar lines the world over. To begin with, they have not been air officers, and no one today is capable of judging air matters unless he is an officer trained in every phase of the air game. This is particularly so of officers in all navies, who, as Admiral Percy Scott says, consider that they commit professional suicide when they cease to advocate the building of battleships, or for a moment countenance any instrument which can destroy a capital or armored ship. As a matter of fact, an armored ship, today, in the face of a good air attack, is as helpless as an armored knight was in the Middle Ages against a foot soldier equipped with a musket.

No navy has ever developed an air service, and ours is more backward in its development than any other of a first-class power. It is psychologically impossible for a navy to develop an air service for the very reason that an air force is designed to destroy the very thing that a naval officer has been raised to honor and respect—that is, the great capital ship.

On the other side of the army, the older officers see in an air force an element of great national and political strength which is apt to diminish proportionally the prestige and importance of the army. This really is a mistaken notion, because an army always is the element of guaranty of national institutions in case of a national emergency. As far as the auxiliary functions are concerned, such as observation for an army or for a navy, it would be very much more efficiently carried out under air force jurisdiction than it would be when turned over to army or navy officers who know practically nothing about air work. Many of these intellectual midgets in the armed services cover up their ignorance of air matters by use of large words and terms which they themselves do not understand.

What we need in this country is just as much light on the air problem as can be thrown—not so much by words as by practical demonstrations before congressional bodies, so that they will be able to judge for themselves. Let the Navy turn out a battleship, torpedo boat destroyer, supply ship, and a scout cruiser. Let the Air Service, under air officers, attack them to show what they can do. Air officers will go so far as

to be willing to let the Navy put every anti-aircraft device they want, with service ammunition, on the ships, providing they can bomb them.

During the last year, over $100,000,000 was set aside for the use of aviation in this country. The Navy has not a single organization which can go to sea and fight for control of the air. They have not a single airplane carrier or single rigid airship—this, after years of development of these things everywhere else. The army has the organizations, the system, and the development for fighting in the air, but, due to lack of appropriations, has not been able to equip these with thoroughly up-to-date American equipment.

Never will this country or any other be properly protected from the air unless one specific man under the Government is charged with the responsibility of developing the air forces. To turn it over to any other department, particularly to one surfeited with prejudice and self-imposed ignorance on the proposition, is the height of national absurdity because the first line of defense, today, of a State lies in the air. The first punch of one nation against another will come through the air, and this will largely determine the outcome of any great war. To do this with the maximum effect requires a United Air Force.

This is the time, above all others, when an accurate estimate of the situation must be made by the American people, and Congress in particular, as to exactly what the lessons of the Great War have been.

Heretofore, war has been conducted in one plane—that is, on the earth or on the water. The mission of an army has been to impose the will of the State on the nation with which it is at war. The mission of a navy has been to keep the sea communications open for its own country, so that water borne traffic might not be impeded by the enemy. The development of an army has been similar since time immemorial—that is, in getting the greatest number of effectives out in the shortest time, transporting them in the quickest manner possible to the point where the greatest decision lies, and in equipping them with constantly improved armament. Navies, similarly, have developed as to number of effectives, protective covering, and gun power. An army can act on the land, and a navy can act on the water. An air force acts over both land and water.

The advent of an air force, however began to modify the strategical organization for national defense. From the minute that airplane attacked airplane in the air, the mission imposed on aviation was to keep the air lanes clear for its own aircraft. This required that the main hostile air force be found and destroyed, as a preliminary measure to any further air work. After predominance in the air has been established, an air force is free to attack ground troops or navies, practically at will. It must be held in mind that the air is the same the world over—that is, an airplane fights in the air irrespective of whether it is over the land or over the water. The same methods of fighting, the same considerations, the same armament, and the same training are required. This requires that all of a nation's air resources be concentrated at the decisive point. If this is not done, and air forces are split up between various departments of the Government, such as the armies, navies, and other organizations, an enemy will most certainly beat them in detail, which has always been the case in military operations. Not only this, but the whole question of rational development and their training, and of material—airplanes, airships, and their construction—must be turned over to officers particularly trained in this kind of work as distinguished from army or navy engineers or constructors.

These are the dominant lessons of the War in Europe. They are those agreed on in every country. Some have not been able to carry them into effect as far as they would like to, but all are in course of carrying them into effect. What we need is just as much light thrown on this subject as possible, so that the people may know the absolute truths of it.

While the ultimate decision in war rests on the contest of man to man, an air force today is the determining factor as to how man shall get close enough to his adversary to be able to take him at a disadvantage. Without an adequate air force, to surprise one army by another is impossible. The attack by aircraft of troops coming up to the line, and the attack of centers of communication and supply at great distances from the actual field of operations can be done in no other way. Over the water, shipping can be destroyed anywhere if the proper organization of air units exists. This includes armored naval ships of the first line as well as any other. The losses of aircraft over the lines during the War from anti-aircraft fire amounted to about one-tenth of one per cent of the airplanes crossing the front. It was almost negligible. There is only one defense against an air force, and that is another air force. Therefore, an air force will control sea communications in the future as it does land communications. The moment that this becomes effective, a navy's mission is at an end, and it is no longer necessary.

Report of Navy General Board

Secretary Daniels has sent to the Senate the special report of the Navy General Board on the policy of suspending the present naval program with particular reference to the capital ship. The parts of the report which refer to aircraft follow.

For twenty years the General Board has been charged with the duty of recommending to the Navy Department the proper types of ships for the Navy each in due proportion. Particularly, since the close of the recent war activities more than two years ago, the General Board has devoted itself to a study of changes proper to adopt in the composition of the fleet in view of the experience of four years of war. The important facts regarding the Naval operations of the war are already generally known and further delay of six months or any other period for the study of types of ships is neither necessary nor advisable.

Concentration of Power Is Sound Tactics

Concentration of power in attack is the fundamental basis of warlike operations, ashore and afloat. Naval concentration of power has been in the main fighting ships of a fleet from the ancient galley period to the present time and the strength of navies has always been based upon the number and power of its ships of the fighting line, that is, of its battleships.

Types change as advance is made in the mechanical arts, arts and sciences and in invention, but the general principle of concentration of power in ships that can take and keep the sea at all times and in all weathers, that can deliver and receive the heaviest blows and that can overcome the strongest ships that may be brought against them will continue as long as navies exist.

Today the opponents of the battleship are basing their arguments upon the present and prospective, especially the prospective, development of submarines and aircraft. It is the old battle of words over again—like that of the torpedo against the big ship, the gun against armor, speed against concentrated fighting power. We are asked to accept hopes for accomplishment.

Finally come the bomb and topedo carrying aircraft to contest the supremacy of the capital ship, as well as of all surface vessels. Great things, not yet accomplished, are predicted by the inventors and enthusiastic supporters of these new weapons, yet if past experience has any value, it may be as confidently predicted that equally fertile invention will provide means for meeting the future development of these weapons and that they, like their dangerous predecessors, will continue to be only adjuncts of the fleet. Already aircraft have been successfully employed in war against aircraft.

No one can foretell what the developments in aviation may bring in the modification of present accepted types of surface vessels, but it may be confidently asserted that changes of type due to this influence will be slow and will not seriously affect the value of the ships now built or to be built in the near future. Changes in military characteristics of battle and other surface ships are frequent in these days of progress in invention, but no revolutionary change is to be expected. Se-

crecy as to basic characteristics can not be maintained and means of defense move in parallel lines and at about equal speed with those of offense.

The unlikely may happen and the protective measures and devices needed for the survival of the capital ship may outweigh and overshadow the value of such ships as primary weapons. Before such a condition is reached, however, the new weapons now under trial will have to attain a general efficiency for in excess of anything they now possess. Predictions are one thing, actualities are another. It would be the height of unwisdom for any nation possessing sea power to put its faith and change its practice upon mere theories as to the future development of new and untried weapons. As yet the protected gun is the most generally effective weapon in existence for naval use. But that fact does not relieve us of the necessity of developing to the utmost new weapons and inventions as rapidly as possible.

At the present time the defense of surface ships against aircraft attack, whether by bombs or torpedoes seems fairly well solved. It consists mainly in meeting aircraft with aircraft. The limitations of aircraft are such that there is no reason why both sides, properly prepared, should not have aircraft at hand when the time and place for their use arises. Victory in the air will then depend upon the greater efficiency in personnel and material in the air service. Hence the need for immediate training and preparation in aviation.

Aviation development over the land has progressed far more than over the water. The difficulties of the effective use of aircraft over water, against ships, are incomparably greater.

During the war the damage to surface vessels from aircraft was practically negligible. It is easy to lay a bomb on the deck of a ship, explode it from a safe place and then exclaim in wonder at the damage it has caused. But it is a very different matter to place that same bomb from the air when under gun fire or attack from other planes. The same is true of the torpedo launched from aircraft. The characteristic weaknesses of the torpedo under the necessary conditions of operations make a hit from the air difficult under the best of conditions, but conceding that it can be done, tests under peace conditions must of necessity be inconclusive as to actual performance under war conditions.

There is no doubt, however, that the future employment of aircraft in connection with naval operations will introduce new problems of attack and defense of far-reaching importance. They will become increasingly valuable adjuncts of the fleet.

The General Board, in its annual report, dated Sept 24, 1920, stated as follows

"It is not too much to say that the influence of seaplanes upon scouting and information gathering duties may revolutionize former navel practice along these lines, though the General Board does not believe that the necessity for surface vessels of the scout or cruiser type will be in any great degree impaired by the use of aircraft as information gatherers".

"Surface vessels will always be needed for use under weather and other conditions when aircraft could not be employed—for the patrol of sea routes, the protection of lines of communications, escort of convoys, screens for fleets and numerous other duties for which aircraft are not suited"

"Airplane carriers are a development of the war. They are to carry airplanes in considerable numbers from which aircraft may fly and return as to a base. Such vessels should be considered as an absolutely essential type in a modern fleet. For the United States Navy they are urgently needed for training the air and the fleet personnel in the use of aircraft in connection with fleet organization and operations".

The completion of that program should not deter us from developing to the utmost new or partly developed weapons, that is, submarines, aircraft and aircraft carriers, and from making such additions to the fleet as will enable us successfully to develop and use surface, subsurface and air methods of warfare to the best possible advantage should the necessity ever arise. In the future, as at all times previous to the World War, we shall, in all probability, have to rely solely upon our own state of preparedness.

National Registration and Licensing

There is at the present time no federal law in existence for the registration of aircraft, nor for the licensing of operators. The only restrictions are those contained in state and local laws and ordinances, as follows:

State of Connecticut, State of Massachusetts, Town of Nutley, N J., Town of Kissimmee, Fla., City of Newark, N J., City of Atlantic City, N J., County of Los Angeles, Calif.

Several bills have been introduced in Congress at various times during a period of years which bills have not passed. The Kahn bill (HR 14061) and the Hicks bill (HR 14137) are expected to be acted upon by the present Congress.

The proclamation of the President of the United States of February 28, 1918, requiring licenses, was rescinded on July 30, 1919, by the President in another proclamation. The last license issued was numbered 233, all of these licenses being to civilian individuals or commercial firms.

It may be of interest to note that flying boats were considered to come under Federal control by an opinion of the Solicitor for the Department of Commerce in 1914. This opinion, however, is held to be rather technical at the present time.

On February 17, 1914, Robert Lee Thurman, Solicitor for the Department of Commerce, rendered an official opinion which placed hydro-airplanes and flying boats under the control of the Federal Government through the Steamboat Inspection Service, Bureau of Navigation, Washington, while they actually navigate the waters of the United States and possessions. It was argued by him "that as life and property are plainly as much in need of protection when transported upon the water in a hydro-airplane as in ordinary powered boats, the spirit and intent of the inspection laws require that a hydro-airplane be regarded as within the operation of these laws if a fair and reasonable construction of their language will permit".

The Act referred to (Act of June 9, 1910, 36 Stat 462) provides for the classification of vessels and requires motor boats, in which classification the hydro-airplane falls, be provided with a sound producing appliance, life preservers, fire extinguishers, etc. It also provides that no such boat while carrying passengers for hire shall not be operated or navigated except in charge of a person duly licensed for such service by the local Board of Inspectors. No examination is required as to the condition of proper requiring license, but such may be revoked or suspended for misconduct, recklessness and the like.

Antony Jannus secured a license under this Act at Toledo on August 10, 1914, the first ever issued for aircraft. Other licenses were issued to A. C. Beech at Baltimore, November 20, 1914, and to S. K. Jacquith at Atlantic City in 1915.

The agitation to secure this decision was started in order to head off state legislation which had already been passed in Massachusetts, Connecticut, and was threatened in New York and elsewhere.

The Aero Club of Pennsylvania was interested in this movement and was able to have introduced in Congress a bill for the national licensing of pilots and the registration of aircraft in order to forestall a situation similar to that existing with respect to automobile touring where the states claim the right to impose varying terms upon motorists. This Congressional measure, however, did not pass.

From time to time there have been introduced in Congress similar bills on which no action has been taken thus far. On March 10, 1920, a resolution was concurred in by the Assembly and by the Senate of the State of New York, urging Congress to enact a law to regulate aeronautics in all states and territories of the United States.

The Internally Trussed Wing

By William B. Stout

Early airplanes were built largely from the aerodynamic standpoint, that is, from a study of the flow of air around curved or shaped surfaces or volumes. This early scale of analysis continued clear up to the war and planes were designed around wing curves of the best "lift/drift ratio" with small attention to the depth of that curve for structure of light weight and low parasite resistance. If a wing curve had a lift-drift ratio of 16 as against a competitor of 12, it was taken for granted that the curve with the highest lift/drift was *the* curve, provided the lift factor was within proper range for possible landing speeds.

When the idea of internal trussing of wings was first presented, reports of the so-called experts of the day were against the type because the wing curves of the thick sections necessary for solving the structural problem of internal trussing were inefficient in their lift/drift as related to other wing curves, although the advantage was admitted of the thick wing sections at slow landing speeds.

In a study of thick wing sections, or any wing section, three things are fundamental: first, the *L/D* ratio, second, the depth of spars for structural lightness, and third, the center of pressure movement and controllability. This latter item, the center of pressure movement, has been neglected as a function of lightness and control in an airplane, but in thick wing sections, it becomes vital, for reasons which will be explained.

The ordinary thick wing section, such as the tadpole type used by the Germans, has the center of pressure movements between angles of attack between 0 and 16 deg., of about 1/3 the total chord of the wing. This means that the total surface for proper controllability must be mounted on a long lever arm formed by the fuselage, and at a distance to the rear of the wing of about three times the chord. This structure must be strong, and therefore of structural weight.

In any wing curve at speed, three-fourths of the total lift is gained by the upper surfaces, while the lower surfaces give but 25 per cent of the lift. This item should be kept in mind preliminary to a proper explanation.

In the German ordinary wing curve, the bottom surface is concave or partially so, and in thick wing sections, convex at the nose and concave toward the trailing edge, giving reason for the nickname of "tadpole" sections given to the German wing.

In adopting a thick wing, we give up curves known to have a lift/drift ratio of, say, 16, and in preference take curves with lift/drift ratio of but 12. This is done because it was found in our first internally-trussed ship completed in America that a plane could be built of this 12 curve much lighter than a ship with a 16 curve, so that what was given up in aerodynamic efficiency, or lift in the wing, was more than given back by the fact that the wing did not have to lift so much per square foot.

The next step and the difference between the American and German method of attack in the internally-trussed problem is that of adopting a "long chord wing" section, instead of the so-called "thick wing" section. Suppose structure requires a wing depth of 18 in. to get spars deep enough and a proper factor of safety. The German method would be to make a thick wing section of, say, five times the depth, or a 90 in. chord at the root of the wing where it joins the fuselage.

In the plan adopted by the Stout "Batwing" type, to obtain depth of wing section, a long chord would be adopted, and for the 18 in. depth, the wing chord at the root would be, say, 12 times the wing depth, or an 18 ft. chord of the wing where it joins the fuselage. In either case, the proper structure required for strength is obtained, although in the Stout type there is space for more spar. In the German type, one has the aerodynamic liability that the wing curve is not good at high speed on account of thickness, like the stubby motor boat. In the long chord type, however, the wing still keeps its efficiency up to very high speeds, so that a greater range of performance is possible than with the German type. Another added advantage in this structure is that more area can be built in the same weight in the long chord type, so that an equal load can be lifted, but in a larger, lighter airplane.

In the above cases, for structural reasons, wings are tapered from the root to the tip so that the wing curves at the tip is of better fineness ratio of thickness to chord than is possible at the root of the wing, on account of the requirements of structure. The chord at the tip is about the same in either case, but the Advisory Committee Report No. 75, recently issued, states that a surprising result of some recent experiments with the tapered plan view wing shows as much as 23 per cent more lift at landing angles than the old biplane rectangular ships, so that what was lost in the wing curve in what is known as the K_y factor, or in lift coefficient, is easily obtained by the added lift advantage of the plan view. This advantage, however, is very much more evident in the long chord design, than in the German type.

Recent analyses are establishing a rule that the aspect ratio of an airplane can no longer be figured as the ratio of the mean chord of the wing to its total span, but is the ratio of the span to the chord *at the tips*, as it is the wing tip loss that makes the advantage or disadvantage of aspect ratio to plan form.

All these things are changing the minds of designers, until they have come to a point where aerodynamic results are not taken as first requirements, but structure and possible weight per square foot form the basis of acceptance or rejection of the final plane. This analysis, therefore, is accepting every item which will enable one to build an airplane of lightest weight per square foot of wing and per horsepower of engine installation, taking it for granted that if this lightest wing is anywhere within the range of aerodynamic advantage, it will have many superior points over other flying structures of greater weight and lesser horsepower per pound. Since at the same time the internal trussing eliminates at one stroke more than half of the total horsepower requirements of a plane for a given performance, even in as crude a beginning as the German Junker, then the end of the entire analysis cannot help but be a very much advanced airplane.

Long chord structure as used on the Stout "Batwing" plane requires a careful study of center of pressure movement on the wing curves used. Ordinary wing curves are not advisable in long chord planes. To obtain a stable wing curve where the center of pressure movement would be a minimum, motor boat sections rather than tadpole sections were designed—these sections having the same curve at the bottom of the wing as on top.

As explained before, the top section of the wing represents about 75 per cent of the total lift at speed, so that in taking top, one can hardly lose more than 25 per cent of the lift of the wing. In internal trussing, however, and tapered spars of the type used, the strength of a cantilever spar is in proportion to the square of the depth of that spar at the root, so that in doubling the depth of the spar, by the change in wing curve we can cut the weight of the plane more than in half. Thus, even if 25 per cent is lost in lift of the wing curve, we would still have gained 50 per cent in lightness, so that the curve is still 25 per cent to the good.

There is an added advantage, however, in that a long tailed structure is not needed to balance the center of pressure movement on the curve, for in fact the controls can be located at the trailing edge of the wing, just as the rudder of a motor boat is at the trailing edge of its curve and steers it equally well right or left. This item saves a great deal of weight of fuselage, and of landing gear height, or fuselage depth, another item very much in its favor. Thus, in the first stage are shown possibility of a great advance in planes and wing curves as related to both aerodynamics and structure, but emphasizing the latter for the major betterment of aircraft control and speed range.

At the present time, planes can travel at little over twice their landing speeds. The new designs are landing at 45 and yet cruise at 100, and speed up to 130 or better.

Japan?

The following excerpts from an article in *The Aeroplane*, London, England, January 19, by C. G. Grey, the editor, gives an interesting view of Japan's air status by a particularly well informed British writer:

Just as it is possible to respect a person's abilities without having any personal liking for him or her, so one may admire a nation's enterprise and self-reliance without liking the people of that nation. Such is one's personal feeling towards the Japanese nation, which one regards as the great menace to the peace of the Pacific. We may expect that before many years are past the alleged humorists of the press will be making much sarcastic play with the meaning of the word "Pacific."

It is commonly known that Japan has for many years been building up a navy and an army which have already placed her among the foremost of the World's fighting powers. Japan is not troubled by any nonsense about making the world safe for democracy. Still less has the Japanese government troubled itself, as ours has done, about making the world safe for hypocrisy. In the most open and above-board fashion Japan has adopted the doctrine of Armed Force as the nation's best safeguard. For this one has the greatest admiration and respect.

The Aeronautical Lesson

So far back as March, 1920, it was reported that the Japanese Military Mission in Europe has bought 300 airplanes, chiefly Spads and Farmans, in France. Presumably these were bought from the French Disposals Board, as there has been no news of the Spad or Farman factories being active on Japanese orders.

Much about the same time, General Nagaoka, the Chief of the Mission, said: "The next war will be an air war, and the nation with the best air service will dominate its rivals both on land and sea." And subsequent events show that Japan is acting up to this obvious doctrine, which seems to be so strangely ignored by our politicians.

Recent Developments

It is curious that Japan's first big purchases of airplanes should have been made in France, seeing that England is supposed to be Japan's *only* European ally. This may be explained by the fact that the Japanese army is in these days largely under French influence, while the Japanese navy is modelled on English lines.

This view seems to be borne out by the further fact that, so far as one can discover, no aircraft have been bought in England for the Japanese army, though a large number—as orders go in these days—have been bought here by the Japanese navy, and it is said that negotiations are afoot for many more. Also, it is understood that French pilots and mechanics have been engaged as instructors for the Japanese army. And it is known that an official mission was to have been sent by the Coastal Area R.A.F. to the Japanese navy, but that this mission was cancelled at the last moment, it is said as the result of representations made by the United States.

Evidently, however, the Japanese believe in our system of naval aviation, for they have engaged privately as instructors, both technical and on the flying side, certain very able officers formerly of the R.N.A.S., and presumably intend to acquire in this way all the knowledge which they would have acquired from an official mission. Which they probably will do just as well and possibly at less expense.

A Technical Advantage

In this they will have something of an advantage over an official mission, for the officers and men of such a mission would only be permitted to fly machines which had been duly passed by the Technical Department of the Air Ministry as being up to our own particular standard of safety. This standard (or factor, if you prefer it) is regarded by some of our best designers as being calculated by such highly academic methods as to detract seriously from the performance of our machines without in fact adding in the slightest degree to their safety.

That being so, free British pilots engaged by the Japanese navy will be at liberty to fly the best possible machines built to the designs of our best possible designers, free from official hindrances. And so it may come to pass that the Japanese flying services may actually be equipped with better aircraft, either for land or sea, than our own. For, be it remembered, in equipping a foreign fighting service there is no need to bother about airworthiness certificates or the International Air Convention, and so each designer is free to do his best.

Who Is the Enemy?

Now, in the light of the very self-evident fact that Japan is undoubtedly equipping her already great army and navy with adequate flying services, it is necessary to consider how and where those services are likely to be used. Japan is not likely to be attacked by China, nor by Bolshevik Siberia, nor by the Rajah of Sarawak (who seems to be the nearest independent monarch), nor by the Commonwealth of Australia. Who, then, is the enemy against whom these great preparations are being made? There remains only the United States.

There is never any difficulty in finding a cause for war if two nations are fated to fight. A row between American and Japanese pearl poachers in the Dutch East Indies, or between American and Japanese seal poachers in the Behring Sea, would suffice, even though both parties in either case were criminals in law and pirates by profession.

When and How?

The more interesting question is when the fight will come. If it comes at all it must come soon. The great new U. S. Navy is not meant to fight us. And if Japan is to fight America, Japan must strike before that American navy is ready.

If Japan openly takes command of the Pacific, which the Japanese navy holds in fact today, she can then land troops in America at her leisure. And, be it remembered, Japan's Mercantile Marine, which is almost the biggest in the world, can handle her army as easily as ours handled our own and America's armies.

Japan would never be so foolish as to land troops on the Pacific Slope of the United States, with the Rockies in front of them. She would undoubtedly land them in Mexico, which is already fuller of Japanese than England was full of Germans before the war, and would attack across the plains of Texas, where her armies would have room to maneuver. Which is one reason why the active service squadrons of the U. S. Air Service are stationed on the Mexican Frontier.

Meantime the Japanese fleet, with long-range guns and bomb-dropping airplanes flying from aircraft-carriers, would make life very unpleasant in Seattle, San Francisco, San Diego, Los Angeles, and other cities more famous for film favorites than for flying forces. And before the attack the Japanese of the Pacific Coast would do quite considerable damage before legging-it (or "beating it," in the still more picturesque American phrase) for Mexican territory.

Preparations for Peace

Meantime it is up to the States to prepare for the attack which may come at any time after the next two years.

The American line of defence is perfectly simple. The worst attack must come from the sea. Therefore the defence must be against the enemy's ships and bombing airplanes.

Against the former the only weapon is the torpedo-dropping airplane. Half a dozen torpedo machines, costing in all perhaps £18,000, will account for any £5,000,000 battleship a hundred miles from the coast. Therefore a fleet of about a thousand torpedo machines stationed along the Pacific Coast will make that Coast safe against gunfire at a cost of less than one battleship.

But over and above these it is necessary to provide defence against the enemy's bombing machines which can leave their ships 200 miles or so from the coast. To meet these machines fighting airplanes, anti-aircraft guns, and search-lights are needed in large numbers.

Furthermore, fighting machines capable of alighting on and getting off the sea will be needed to escort the torpedo machines in the attack on the Japanese fleet, for it may be assumed that the fleet will carry short-range high-performance fighters with which to beat off torpedo attacks. These machines are of a species allied to our amphibian fighting-machines, and here again we know rather more than most people. It is to be hoped that in this direction the U. S. Army, or Navy (whichever has the job of defending the Pacific Coast) will not be too proud to learn from us.

Meantime, as has been said, one is filled with admiration for Japan's energy, and enterprise, and self-confidence. It would be all the better for this country if our political people had as much.

Tests for Aviator's Certificates

Instructions governing the conduct of tests for Aviators' Certificates as issued by the Aero Club of America under the rules of the International Aeronautic Federation are as follows

Candidates must accomplish the two following tests, each being a separate flight

Test A—A flight without landing, during which the pilot shall remain for at least an hour at a minimum altitude of 2,000 meters above the point of departure. The descent shall finish with a glide, the engines cut off at 1,500 meters above the landing ground. The landing shall be made within 150 meters or less of a point fixed beforehand by the official examiners of the test without starting the engine again.

Test B—A flight without landing round two posts(or buoys) situated 500 meters apart, making a series of five figure-of-eight turns, each turn reaching one of the two posts (or buoys) This flight shall be made at an altitude of not more than 200 meters above the ground (or water) without touching the ground (or water) The landing shall be effected by

1. Finally shutting off the engine or engines at latest when the aircraft touches the ground (or water)
2. Finally stopping the aircraft within a distance of 50 meters from a point fixed by the candidate before starting.

The candidate must be alone in the aircraft during the two tests.

In flights for hydroairplane certificates, starting from and landing on the water is permitted for all of the tests.

The course on which the candidate accomplishes the test B must be marked out by two posts or buoys situated not more than 500 meters (547 yards) apart.

The turns round the posts or buoys must be made alternately to the right and to the left, so that the flight will consist of an uninterrupted series of five figure-of-eight turns.

The issuance of the certificate is always discretionary

The responsible representative of the Contest Committee is charged with the supervision of the tests and is responsible for the preparation and accuracy of the reports which must be dated, signed and returned to the chairman of the Contest Committee as soon as practicable after the completion of the test.

The responsible representative must see that the posts or buoys about which the aviators turn are located at a distance not greater than 1640.4 feet (500 meters) apart, and shall note in the report the way in which the distance between the posts or buoys was measured, whether by chain, steel tape, metallic tape, etc.

An observer must be stationed in the close vicinity of each post to see that the turns are made in the proper order, direction and number

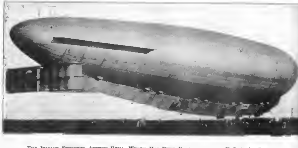
Under the heading of "Remarks" the time of day and weather condition should be noted and the comment of the responsible representative as to the manner in which the applicant handles his machine

The observers are required to fill in the answers to the following questions·

A Duration and altitude Did candidate remain at a minimum altitude of 2,000 meters throughout a period of at least one hour? Was the descent made from 1,500 meters with the motor cut off throughout? Was the alighting made in view of the observers? Was the alighting made in a satisfactory manner?

B Distance flight Was the flight made in accordance with provisions in Test "B"? *Alighting*· Was the alighting made on land or water? Was the alighting carried out in a satisfactory manner? At what distance from the mark did the aircraft come to rest? How was course measured and how marked?

The report must be signed by the representative of the Aero Club of America and also by that of the observer



The Italian Semirigid Airship Roma, Which Has Been Purchased by the U. S. A. Air Service

The Monocoque Fuselage

By Lester D. Seymour, E. E.

During the late war, among many other developments along the line of aeronautics, there appeared a one piece laminated wood fuselage for airplanes which, while approximated in this country, has not been exactly reproduced. The French word *monocoque* as applied to an airplane fuselage means simply a fuselage that is truly one piece and so built. The nearest American approach is found in the Verville racer built by the U S Air Service for the Gordon Bennett race. It is the purpose of this article to present for those interested in building airplanes the general method employed in this type of construction and to point out in not too great detail the advantages which it has been hoped to obtain.

After the war, while in Paris the writer was privileged to visit several factories building airplanes and among them one engaged in the manufacture of the true monocoque fuselage, Only the very rough notes made at that time and sketches made later are available as a basis for this description and consequently there can be given only approximate dimensions, etc.

The fuselage as constructed in the factory visited was built of thin laminations similar to those used in ordinary ply wood glued and bradded in place. The pieces used in building up this laminated ply wood were approximately 1/16 in, in thickness and from ¾ to 1¾ in. in width, varying with the position in which they were placed on the fuselage, requiring more or less bending or forming. The laminations described varied in length from pieces not more than 1 ft. long to pieces up to 15 ft in length. The application of the laminations to the fuselage building up the veneer or plywood was made as shown in Fig 1. The procedure follows

A series of wooden discs or plates whose circumference fits the section of the fuselage at any particular point are placed in proper sequence and spaced at about 5 in intervals on a steel tube about 4 in. in diameter, of a length just enough greater than the total length of the fuselage to enable the builders to place supports or "horses" under the ends in a position most advantageous for the workman to apply the different layers of wood and adjust the longitudinal members. These disc forms are about 2 in. in thickness and held in their proper position on the tube or shaft before mentioned by means of wooden sleeves placed between each disc. The whole assembly is held in position by large nuts placed on either threaded end of the tube, holding all the discs in compression, each against the one next to it.

At the small or tail end of the fuselage (the fuselage section is usually circular or slightly elliptical as built in the monocoque) a framework or internal truss forming the ribs of the horizontal stabilizer and vertical fin is set in position and attached to four or six longitudinal members (longerons) of the fuselage to be, these being equally disposed around the circumference of the circular discs of the form, each set in grooves or notches in the edges of the discs. At the forward end of the fuselage there is placed at the position where the wing roots will be, wooden members attached to permanent rib members of the fuselage, at that point.

These longitudinal members or longerons must not be confused with longerons as we know them, because they have no struts and are smaller in section (as their number increases) than an equal number of the usual longerons would be

The application of the plywood is now begun. Beginning at the rear of the fuselage, the end of a strip of wood such as described above is tacked to one of the longitudinal fuselage members and wound spirally around the fuselage toward the forward end, being tacked or bradded at the proper places to the longitudinal members at an angle of approximately 45 deg This process is continued until the form is entirely covered with a series of these strips side by side spirally around fuselage and attached to the form of internal bracing of the stabilizer wing roots and longitudinal bracing.

An opening is left in the fuselage for the pilot and observer to enter the cockpit, also on approximate place for the engine at the extreme nose.

After the model has been given one complete layer of lamination, the process is repeated, this time as in usual plywood practice, laying the strips of lamination in opposite directions and gluing the layers together While constructing any particular layer, it is often held in place by small pieces

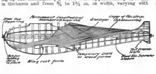


Fig 1. French Monocoque Construction

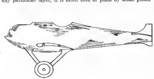


Fig 2. French Monocoque Fuselage Completed

or blocks of wood tacked over its surface to maintain the curvature, since permanent tacks are only placed at the position of the longerons or other bracing. This process is continued until the plywood has reached a thickness of five layers.

The fuselage will now appear (Fig 2) to be wood moulded in the form of an airplane, including everything except the actual wings. This conception is the more strong because the wood having been applied in thin layers as described, has conformed exactly to all the curves of the wing root, stabilizer, vertical fin, wind shield and nose cowlings until it really appear to be one piece, which impression is strengthened after the fuselage has been carefully sandpapered and the first application of varnish applied. The rudder too, has been made of formed plywood so that in the finished plane the wings will be the only fabric upon the plane.

The forms or wooden discs before mentioned are now removed by first sliding out the long tube and transferring the weight of the fuselage from the tube to "horses" now bearing directly upon the fuselage. The discs are collapsible and removed through either the cockpits or engine openings in the large end of the fuselage. The types which the writer saw completed were built both for rotary and Hispano-Suiza engines and the engine cowling or nose of the fuselage was slightly different in each case to conform to the requirements by the two different engines.

At whatever interval necessary to give the required stiffness to the structure, light metal bulkheads were placed inside the fuselage. In the front end the engine bearers were at-

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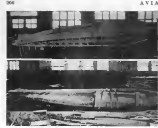

Fig 3
Fig 5

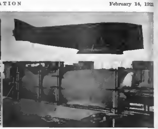

Fig. 4
Fig 6

Photo U S A. Air Service

tached to such strength members. Other construction in the cockpits, etc. was carried out in a like manner.

The American tendency in building similar fuselages as exemplified in the Verville designs has been to build them in halves, placing the two together afterward. The structure again differs from the original French in that it is covered with fabric. This method has the obvious advantage of easier removal of the forms, but presents a disadvantage in the fastening together of these two halves.

Not only are transverse members in the form of discs used in the Army construction, but as shown in Fig. 3, longitudinal form members are applied which exactly conform to the desired contour of the finished fuselage. The appearance of this form just previous to the application of the laminated wood is shown in Fig. 4.

During the process of forming the narrow strips of plywood, the forms may be laid on horses as shown in Fig. 5, thus facilitating this work to a great extent. In this feature there seems to be another advantage over the French method. From Fig. 5 also a good idea of the work may be obtained. Similar to the French practice it will be seen that small blocks of thin wood are tacked over the surface of a newly applied strip to hold it in place until the glue has set.

A completed half of the shell or "skin" is shown in Fig. 6 just after the form has been removed. Incidentally this makes evident the ease with which, by the American method, the form can be removed from the skin. Many photographs have been published showing the Verville, which is the finished product, fabric covered and ready for flight.

While it would be impossible to discuss here in detail all the questions as to strength, design, etc., involved in this type of construction, it is interesting to note that a tremendous improvement in streamlining can be thus effected and that external bracing can be reduced to almost nothing.

As for the French progress along this line, the test of the finished planes made in this model were just beginning to be made in May, 1919, but from the few that had been tried out at the time, the results seemed very promising and the manufacturers were very enthusiastic about their work, claiming that this particular construction would give greater strength, more perfect streamline, increase the factor of safety in attaching the members of the tail group, reduce weight, add to the general appearance and weather resisting qualities and produce a more easily maneuverable ship than by the old method of construction. It was also said that this method of fuselage building would reduce the cost of production materially be a saving of valuable materials, reduce the complexity of design, repair and maintenance, and be much safer for the pilot in case of accident. On the whole, the fuselages and sample airplane which the writer saw in the factory certainly made a pleasing impression and gave the appearance of great strength and flexibility with minimum weight.

Aero Club of America Personnel

The Contest Committee of the Aero Club of America for 1921 consists of, Caleb S. Bragg, Chairman; Maurice G. Cleary, David H. McCulloch, Richard F. Hoyt, Charles E. Merrill, Edward O. MacDonnell and Harry F. Guggenheim.

The following resolution regarding a National Advisory Board, was unanimously adopted by the Board of Governors, December 1920:

Resolved that there is hereby created a Special Committee of the Club to be known as the Aviation Board whose functions shall comprise the coordination of all activities in connection with the preparation and conduct of all contests held under the auspices of the Contest Committee of the Club and to render such aid and advice to the Contest Committee as its chairman shall deem necessary. The Chairman of the Aviation Board shall designate all sub-committees and select the Chairman and members thereof, reporting from time to time his actions in that regard to the Board of Governors. Mr. Caleb S. Bragg was made Chairman of the Aviation Board. (Mr. Bragg is also Chairman of the Contest Committee.)

The Balloon Committee of the Aero Club of 1921 consists of: Mr. Alan R. Hawley, Chairman; Mr. Augustus Post, Mr. Ralph Upson, Major J. C. McCoy, Mr. Howard A. Scholle, Mr. A. Leo Stevens, Major Thos. S. Baldwin, Mr. Geo. M. Myers, Major Albert Bond Lambert.

The Board of Governors of the Aero Club follows: Myron T. Herrick, Chas. Lane Poor, Henry A. Wise Wood, Jas. A. Blair, Jr., Jefferson DeMont Thompson, W. Redmond Cross, Douglass Campbell, Philip J. Roosevelt, Maurice G. Cleary, Chas. Jerome Edwards, F. Trubee Davison, Chas. E. Merrill, Cortlandt F. Bishop, Benjamin F. Castle, Philip A. Carroll, Caleb S. Bragg, Arthur A. O'Brien, Wm. A. Larned, A. C. Batchelder, Godfrey L. Cabot, Howard E. Coffin, Benedict Crowell, Rear Adm. B. A. Fiske, U.S.N., Chas. J. Biddle, Albert Bond Lambert, Geo. M. Myers, Richard F. Hoyt.

1921 Gordon Bennett Balloon Race

The Gordon Bennett International Balloon Race is to be held Sept. 17, 1921, in Belgium. Entries may be made up to April 1. The *national* elimination race (for the selection of the American team to go to Belgium to compete for the G-B trophy) will probably be held some time during the month of May. The exact date and place for this latter race, however, has not been determined.

Progress of British Civil Aviation

The British Controller-General of Civil Aviation has issued his third report on the Progress of Civil Aviation, covering the six months' period from April 1 to September 30, 1920. A fairly comprehensive summary of the report, sent by Leslie E. Reed, U. S. Consul in London, is given herewith, practically in full:

The policy of assisting insurance companies to establish aviation insurance has been continued, and in addition to providing information respecting the certification of aircraft, the licensing of pilots and airdromes, and the standards applied in the official medical and technical examinations, means have been afforded of obtaining subsequent information concerning pilots, engines, and aircraft by the introduction of log books, compiled in consultation with the representatives of the aircraft industry. These are now available to the public. The only fixed rates of insurance so far quoted are those for passenger risks.

Air Treaties—International Services in Operation

While several of the minor States have ratified the International Air Convention, general ratification has not yet taken place, but temporary agreements have been negotiated with Norway, Sweden, Denmark, and Finland; these have not yet been signed. Monthly conferences have been instituted with the French and Belgian air authorities in order to discuss all matters in connection with civil aviation affecting them, pending the establishment of the International Commission of Aerial Navigation.

Regular services have now been established from London to Paris, to Brussels, and to Amsterdam, and passenger, mail and goods traffic has increased substantially compared with previous periods. Amsterdam has been the junction for air lines to Germany and the Scandinavian countries. The total number of machine-miles, 689,600, is an enormous increase on the figure for the previous six months, and is even substantially more than the figure of 460,300 miles during the early period of civil aviation in 1919, when the majority of the trips were "joy flights." It is interesting to note also that the aggregate machine mileage since May, 1919, is well over 1,000,000 miles. Similarly the number of passengers has been greatly increased, 32,345 having been carried. Goods have increased from 25¾ tons to 86½ tons, while the number of departures and arrivals to and from the Continent has risen from 734 to 24,445, and the value of imports from £131,615 to £376,606 (from $646,504 to $1,832,573) and of exports from £63,743 to £168,300 (from $310,205 to $818,032). The number of letters carried since the inauguration of the mail service shows a steady increase, especially on the London-Amsterdam service, and an efficiency of 76 per cent, 94 per cent, and 84 per cent has been obtained on the London-Paris, London-Brussels, and London-Amsterdam services, respectively.

Simultaneously with the advance in the commercial service, progress has been made in developing the ground organization in order to provide for the expansion of services in the future. Improvements have been effected in the general equipment of the two Government-owned customs airdromes at Croydon and Lympne; the Board of Customs and Excise has agreed to grant customs facilities for seaplanes and flying boats at certain ports on the southeast coast, and, with the consent of the Admiralty, it is hoped to include an air port on the Medway. In addition, negotiations have been continued for the use of the Thames above Westminster Bridge by aircraft employed on mail service and other traffic.

Night Flying—Wireless Aids

Regular night flying for commercial purposes has not yet been attempted, but the experimental lighthouse at Croydon has proved of value to belated machines landing after dark. Two more experimental lighthouses are to be installed, one at Lympne and one midway between London and Folkestone. The civil airdromes at Castle Bromwich, Manchester, and Renfrew will be similarly equipped, when the volume of night traffic renders this desirable.

The wireless direction finder apparatus installed at Croydon has proved its value, enabling aircraft to correct their course in thick weather; and the equipping of aircraft with wireless telephones is extending, as they are found to be of considerable assistance to navigation. For the same reason the marking of the names of towns and railway junctions around London so as to be seen from the air has been continued. Electric landing lights for indicating the direction for landing are being installed at Croydon airdrome, and trials are being made at the same place to test the value of powerful searchlights as a means of helping to locate the airdrome.

The installation of wireless stations for telephony and telegraphy has been continued, and stations are now open at Croydon, Lympne, Castle Bromwich, Manchester, and Renfrew. The British proposals for the new radiotelegraph and telephone convention, including all forms of communication to and from aircraft, have been framed, and these are now being considered by an international conference at Washington.

Meteorological Information—Licenses

The transfer of the naval meteorological services to the Air Ministry has completed the unification of the meteorological services of the country. The consolidation has proved to be beneficial, and further new distributive stations have been opened. The number of inquiries for forecasts and information on general meteorological matters has shown a steady increase; among such have been frequent requests from farmers for direct telegraphic forecasts. Special upper-air investigations have been conducted by pilots lent by the Royal Air Force.

A large number of new licenses have been issued to civil pilots and ground engineers, and the number of registered aircraft for civil flying has also grown. Revised regulations governing the issue of certificates to aerial navigators and pilots have been drawn up and arrangements made for the technical examination in navigation of civilian pilots. These navigation tests will be strictly enforced in future.

It is now possible to begin to judge the effect of continuous flying on those engaged in the regular Continental services or on other continuous air work. It is interesting to note that the physical condition of the pilot so employed compares favorably with that of the selected university athlete or of the candidate for a commission in the R.A.F.

Work of the Department of Research

Experiments have been conducted by the Department of Research into the development of several new types of power plant, and, if these are successful, it will be possible to use a fuel of a higher flash point, thus making for safety and cheapness. Several new designs of aircraft are being produced with facilities for making adjustments to the engine during flight, and a satisfactory engine starter for use on the ground is now available.

Other investigations have been carried out to minimize the effects of mist and fog by mechanical dispersal, to secure the illumination of landing grounds, to produce mechanical apparatus to cause machines to flatten out automatically just before touching the ground, and to construct instruments for indicating accurately to the pilot his position in relation to the aerodrome and his height above the ground. Among other problems under consideration are those connected with the all metal machine, helicopter, amphibian, and various instruments for night flying.

As already announced the Department of Civil Aviation has agreed temporarily to take over all airships in order to carry out experimental work of an operational character. The Research Department is carrying out investigations in technical details affecting the possible future operation of airships in dry climates (Egypt), while an improved mooring mast is to be erected in order to carry out further tests in mooring airships.

The budget provided for an expenditure of £1,000,000 ($4,866,500) in aid of civil aviation during the present year.

When the estimates were drawn up it was adopted as a guiding principle that expenditures should be estimated so as to procure the extension of general ground organization both in this country and on cross-channel and imperial air routes should the development of civil aviation warrant it. Expansion, however, has been principally confined to the air service to the Continent.

On the England-Egypt route a site has been secured at Malta for a new aerodrome, and steps have been taken to insure the wireless communications along the air route between England, Malta, Egypt, Mesopotamia, and India. The preparation of the Egypt-India route has been delayed owing to the unsettled conditions prevailing in Mesopotamia and Persia. Arrangements are being made whereby the maintenance of the aerodrome on the Cairo-Cape Town route will be borne by local governments; this will relieve the British Government of financial responsibility in the future.

In Australia several air routes have been surveyed, and various schemes for the organization of new air services between the principal towns are under consideration. In Canada a Government civil aerodrome has been opened at Ottawa, and a seaplane station at Vancouver is nearing completion. All regular Government air stations will be available as commercial stations, and a preliminary survey of certain proposed air routes has been carried out. In India the air board has decided upon the provision of aerodromes on the Calcutta-Delhi-Bombay, Bombay-Karachi, and Calcutta-Rangoon routes. An air board has been formed in New Zealand.

South Africa and Bermuda

It is understood that the South African Government will decide upon its policy in regard to civil aviation, particularly as affecting air mails and the organization of an air defense force as soon as the director of air services arrives in the Dominions. A company in Bermuda is operating an air service and is projecting new schemes in the West Indian Islands.

Suggested Competition for Los Angeles Chamber of Commerce Trophy

Of immense significance as an indication of the trend of aeronautic activities in the United States are the following suggestions submitted to the Los Angeles Chamber of Commerce in response to request for information from the office of the Chief of Air Service through its Civil Affairs Division as to the best method of encouraging commercial aviation through the instituting of aerial competitions and the offering of prizes for performance records.

General Nature of Suggested Competition

1. The Los Angeles Chamber of Commerce, for the purpose of encouraging practical aeronautics in the State of California, offers a trophy to that individual, partnership or corporation who, during the year 1920, for a period of not less than one month, engaged in commercial aviation in a business way and as a result of their efforts directly or indirectly contributed to the advance of commerce and the economic wealth of the state.

2. Any type of airplane, seaplane or dirigible, engine, fuel or lubricant, may have been used.

3. The activity for which the prize is claimed must have extended over a period of one calendar month.

4. Points will be given for each of the following phases of the activity and the prize will be awarded to that individual, partnership or corporation obtaining the largest number of points of a total of 100.

(a)	Safety to life	40
(b)	Financial profit to community	20
(c)	Financial profit to firm or individual	10
(d)	Efficiency in airplane performance	10
(e)	Permanence of occupation	20

Explanation

1. *Safety to life.* 40 points will be given to that firm who during the month selected did not damage an airplane other than the ordinary wear and tear, 50 per cent will be deducted for each crash requiring repair beyond one working day.

(b) *Financial profit to community.* 20 points will be allowed to that competitor who shows that he has performed a certain economic function better than could otherwise have been performed by any available existing agency. All applicants will be rated priority and allotted proportionately their share of the total of 20 points under this heading.

(c) *Financial profit to firm or individual.* A financial statement showing cost and net profit for any one month must be given under this heading and points will be allotted accordingly.

(d) *Efficiency in airplane performance.* An estimate based on useful load, on the ratio of pounds carried per gallon of gasoline used, using the formula $\frac{W}{G}$, where W is the useful load, irrespective of time carried or weight of pilot, instruments and standard essential load.

(e) *Permanence of occupation.* 20 points will be given under this heading to the firms still operating in the same manner. 5 per cent of this number of points will be deducted for each month that the firm does not carry on the occupation named and nothing will be alloted to a firm that has ceased operations entirely with no intention of carrying on the business.

Application Form. To be made up in accordance with above.

General Mitchell on Aviation

General Mitchell is to be commended for his frank and fearless testimony as to the importance of aviation in future warfare. He may have erred in some of his statements and he may have exaggerated the dangers to which a surface fleet will be subjected by air attack.

Secretary Daniel's comments upon General Mitchell's testimony were undignified and gratuitously offensive to that officer. The General had a perfect right to express his personal opinion that an air force would drive dreadnoughts from the sea and would provide a surer and much more economical defense for our coasts than the expensive forts and big guns upon which we now rely.

If the General is wrong the fact can be demonstrated in a searching and dignified investigation by Congress. The people of this country, who are to foot the bills, wish to know the truth and the whole truth before they spend more billions. Mr Daniels and the few naval officers whose minds go along with his should not be permitted to stifle discussion and to dictate the decision as to our naval policy in the last thirty-four days of his disastrous administration.

In truth the country owes General Mitchell a vote of thanks. Inasmuch as admirals and naval officers of independence are not permitted to speak it is most fortunate that a general of the Army has torn off the lid. We may hope that Mr Baker will not meekly submit to a kaiserlike attempt by Mr Daniels to throttle Army officers as well as admirals—who "cannot say that two and two make four!"—*New York Tribune*

Book Review

THE AIRPLANE by Frederic Bedell, 257 pp.; illustrated, published by D. Van Nostrand Co., New York.

The Airplane by Frederic Bedell is a very practical and simple treatise on the elementary theory of the airplane. The first chapter takes up sustentation of the airfoil in a concise manner. The usual elementary theories are set forth in an orthodox and straightforward manner, with real simplicity of treatment.

The second chapter takes up relations in flight, variation of velocity with lift and variations due to engine power changes and density of altitude. Parasite and wing resistance are discussed fully in chapter three, with methods of calculation and diagrams showing how resistance is modified by properly shaping exposed members.

Chapters four and five deal with the thrust for different conditions of loading, resistance and power required. The remaining chapters deal with conditions in climbing and gliding, airplane performance at different altitudes, the aerodynamics of single and multiple planes, longitudinal stability and lateral stability are clearly and correctly dealt with. As a book for a beginner the work is excellent.

Air Service Promotions

The following promotions in the Air Service, sent to the Senate on Jan. 18, were confirmed Jan. 29:—

[*To be majors with rank from July 1, 1920*]

Maj. Jenner Young Chisum, Capt. Raymond Sidney Bamberger.

[*To be major with rank from January 18, 1921.*]

First Lieut. Fred Hughes Coleman.

[*To be captains with rank from July 1, 1920.*]

Capt. Elmer Adler, Capt. Truman Wike Allen, Capt. Archie Wright Barry, First Lieut. William Alfred Bevan, Capt. Thomas Boland, First Lieut. Arthur Wellington Brock, jr., Capt. Arthur Raymond Brooks, Capt. Norbert Carolin, Capt. Frederick Foster Christine, Capt. Charles Palmer Clark, Capt. Ernest Clark, Capt. John Graham Colgan, Capt. John Joseph Devery, jr., Capt. Howard Thomas Douglas, Capt. Harry Coleman Drayton, Capt. Aubrey Irl Eagle, Capt. Roscoe Fawcett, Capt. Reuben Hollis Fleet, Capt. Harrison William Flickinger, Capt. Christopher William Ford, Capt. Calvin Earl Giffin, Capt. George Eustace Amyot Hallett, Capt. Harold Evans Hartney, Capt. Horace Nevil Heisen, Capt. Lynwood Benjamin Jacobs, Capt. George Churchill Kenney, Capt. Lonie Ridney Knight, Capt. Edward Laughlin, Capt. Eugene Lazar, Capt. Francis Beatty Longley, Capt. Allan Parker McFarland, Capt. Dale Mabry, First Lieut. Roy Louis Noggle.

Capt. William Charles Ocker, Capt. Charles Thomas Phillips, Capt. Edward Joseph Ralph, Capt. Clearton Howard Reynolds, Capt. Charles Merrill Savage, Capt. David Sidney Seaton, Major Floyd Newman Shumaker, Capt. Albert Daniel Smith, Capt. Harry Marcy Smith, Capt. Lowell Herbert Smith, Capt. Albert William Stevens, Capt. William Frederick Volandt, Second Lieut. Harold Eastman Weeks, Capt. Chilion Farrar Wheeler, Capt. Henry Capron White, Capt. John Garrett Whitesides, Capt. Burdette Shields Wright, First Lieut. Frank Wilbur Wright, Capt. Byrne Virchow Baucom, Capt. Harvey Weir Cook, Capt. James Francis Doherty, Capt. Charles George Eidson, Capt. Oliver Stevenson Ferson, Maj. Melvin Adams Hall.

[*To be first lieutenants with rank from July 1, 1920.*]

First Lieut. Richard Thomas Aldworth, First. Lieut. William Valery Andrews, Capt. Dogan Humphries Arthur, First Lieut. Charles Bernard Austin, First Lieut. Fred Austin, First Lieut. Karl Shaffner Axtater, First Lieut. Eugene Hoy Barksdale, Capt. Frank Merrill Bartlett, First Lieut. Eugene Benjamin Bayley, First Lieut. Walter Bender, First Lieut. Edward Crews Black, First Lieut. Thomas Welch Blackburn, Capt. Shires Alexander Blair, First Lieut. William Henry Blenkley, First Lieut. Rowland Charles William Blessley, First Lieut. Fred Sidney Borum, First Lieut. Ulric Louis Bouquet, First Lieut. Robert James Brown, First Lieut. Oliver Grant Brush, First Lieut. Wallace Cole Burns, First Lieut. Byron Turner Burt, jr.,

First Lieut. Franklin Otis Carroll, First Lieut. James Bernard Carroll, Capt. William Henry Carlby, First Lieut. Claire Lee Chennault, Capt. John Martin Clark, First Lieut. Ross Franklin Cole, Capt. Carl William Connell, First Lieut. Benedict Arthur Coyle, First Lieut. Neal Creighton, Capt. Isaiah Davies, First Lieut. Raymond Ellis Davis, First Lieut. Robin Alexander Day, First Lieut. Charles Burton De Shields, First Lieut. Harry Arden Dinger, First Lieut. Benton Arthur Doyle, Capt. Alonzo Maning Drake, First Lieut. Donald George Duke, First Lieut. Asa North Duncan, First Lieut. Claude Edward Duncan, Capt. Frederick Irving Eglin, First Lieut. Merrick Gay Estabrook, jr., Capt. Asa Jeremiah Etheridge.

First Lieut. Muir Stephen Fairchild, First Lieut. Karl de Vries Fastenau, Capt. Edward Lewis Fernsten, First Lieut. Rex Everett Field, Capt. Charles Rochead Forrest, First Lieut. Arthur Lee Foster, First Lieut. Samuel Gordon Frierson, First Lieut. Carl Brewer Fry, First Lieut. Guy Harrison Gale, First Lieut. Raynor Garey, First Lieut. Alfred Clarence George, First Lieut. Harold Huston George, First Lieut. William Seymour Gravely, Capt. William Andrew Gray, First Lieut. Carl Franklin Greene, First Lieut. Russell Molland Greenslade, First Lieut. James Lionel Grisham, First Lieut. Albert Michael Guidera, First Lieut. Edward Higley Guilford, First Lieut. Frank Dennis Hackett, First Lieut. Edward Meeker Haight, Capt. Fraser Hale, First Lieut. Joseph English Hall, First Lieut. Harold Ross Harris, First. Lieut. Lloyd Leon Harvey, First Lieut. William Albert Hayward, Capt. James Andrew Healy, First Lieut. Virgil Hine, Capt. Earl Seeley Hoag, Capt. Harlan Ware Holden, First Lieut. Harvey Hodges Holland, First Lieut. Richard Orleans Hunnam, First Lieut. Leland Charles Hurd, First Lieut. Don Lee Hutchins, Capt. James Troy Hutchison.

Capt. Stephen Joseph Idzorek, First Lieut. J. Thad Johnson, Capt. Winant Pullis Johnston, First Lieut. Aaron Edward Jones, First Lieut. Edward Davis Jones, First Lieut. Ulysses Grant Jones, First Lieut. Clarence Peyton Kane, First Lieut. Robert Kauch, Capt. Frank Kehoe, jr., Capt. John Carroll Kennedy, First Lieut. Frederick Putnam Kenny, First Lieut. Horace Simpson Kenyon, First Lieut. Alvan Cleveland Kincaid, First Lieut. Alfred Foster King, jr., First Lieut. Richard James Kirkpatrick, First Lieut. Leonidas Lee Koontz, First Lieut. John Tollefson Lanfall, First Lieut. Lawrence Augustus Lawson, Capt. Walter Ralls Lawson, First Lieut. Charles Manning Leonard, First Lieut. Burton Frederick Lewis, First Lieut. Martin Sidney Lindgrove, First Lieut. Samuel Milhollen Lunt, First Lieut. John Edward Lynch, Capt. William Elmer Lynd.

First Lieut. John Michael McDonnell, First Lieut. George Wilbur McEntire, First Lieut. Frank Morton McKee, Capt. John Arthur Macready, First Lieut. Alfred Warrington Marriner, First Lieut. Bruce North Martin, First Lieut. Paul Jones Mathis, First Lieut. Russell Lowell Maughan, Capt. Charles Raymond Melin, First Lieut. Clarence Lloyd Midcap, First Lieut. Walter Miller, First Lieut. Charles Hufford Mills, Capt. John Isham Moore, First Lieut. Edward Moses Morris, Capt. Corliss Champion Moseley, First Lieut. Langhorne Waldo Motley, Capt. William Herbert Murphy, Capt. Donald Patrick Muse, First Lieut. Devereux Maitland Myers, First Lieut. Clifford Cameron Nutt.

Capt. Robert Oldys, Air Service, First Lieut. Robert Sanford Olmsted, First Lieut. Edwin Randolph Page, First Lieut. George Merrill Palmer, Capt. George Franklin Parris, First Lieut. John Bellinger Patrick, Capt. George Beatty Patterson, First Lieut. Albert Brown Pitts, Capt. Fred Place, First Lieut. Leo Fred Post, First Lieut. Rudolph William Propst, First Lieut. Charles Addison Pursley, First Lieut. Alfred Isaac Puryear, Capt. Marion Gardner Putnam, First Lieut. Merwyn Calvin Randall, Capt. Walter Jay Reed, First Lieut. Walter Hey Reed, First Lieut. Monroe Reynolds, First Lieut. John Paul Richter, First Lieut. Henry Irving Riley, First Lieut. John Pierre Roullot, First Lieut. Francis W. Ruggles, First Lieut. Edwin Andrews Russell.

First Lieut. Philip Schneeberger, Capt. Earl Spiker Schofield, First Lieut. John W. Shoptaw, First Lieut. John William Signer, First Lieut. Louis Charles Simon, jr., Capt. Arthur Emel Simonin, First Lieut. John William Slattery, First Lieut. Kellogg Sloan, First Lieut. Edgar Lee Smith, First Lieut. Junius Augustus Smith, First Lieut. Lotha August Smith, Capt. Clifford Erle Smythe, First Lieut. Henry Jerome Spalding, Capt. Martinus Stenseth, First Lieut. Rex Kirkland Stoner, Maj. Victor Herbert Strahm, Capt. St. Clair Street, First Lieut. Joseph Leonard Stromme, First Lieut. Rene Raimond Studler, Capt. Harry Allen Sutton, Capt. Arthur Thomas, First Lieut. Richard Edwin Thompson, Capt. Julius Conrad Tips, jr., First Lieut. Otto Gresham Trunk, First Lieut. William Turnbull, Capt. Paul Roper Turpin, Capt. Frank Benjamin Tyndall.

First Lieut. George Luke Usher, First Lieut. Arthur William Vanaman, First Lieut. Solomon Lee Van Meter, jr., First Lieut. John Parker Van Zandt, First Lieut. Raymond Edward Vaughan, Capt. Thomas Settle Voss, First Lieut. Perry Wainer, First Lieut. Henry Jay Ward, First Lieut.

Harry Weddington, First Lieut. William Downing Wheeler, First Lieut. Ennis Clement Whitehead, Capt. Frederic Berard Wieners, First Lieut. Donald Wilson, First Lieut. Walter Drake Williams, First Lieut. John Y. York, jr., First Lieut. Harry Herman Young, Second Lieut. Morton Donald Adams, First Lieut. Max Balfour, First Lieut. Morris Berman, Second Lieut. Halsey Lyle Bingham.

Capt. Clayton Lawrence Bissell, First Lieut. Edmund Pendleton Gaines, First Lieut. Armin Ferdinand Herold, First Lieut. Frank O'Driscoll Hunter, Capt. Ira Robert Koenig, Capt. John McRae, First Lieut. Harry Gage Montgomery, Second Lieut. Erik Henning Nelson, First Lieut. Bob Edward Nowland, First Lieut. Lawrence Irvin Peak, First Lieut. Laclair Davidson Schulze, First Lieut. Lorenzo Lamont Snow, First Lieut. Theose Elwin Tillinghast, First Lieut. LeRoy Moore Wightman.

[To be second lieutenants with rank from July 1, 1920.]

Second Lieut. Evers Abbey, Second Lieut. James Ellsworth Adams, Second Lieut. William Tillmon Agee, Second Lieut. Ames Scribner Albro, Second Lieut. Frank Potter Albrook, Second Lieut. Irwin Stuart Amberg, Second Lieut. Stanley Mitchell Ames, Second Lieut. William Noel Amis, Second Lieut. Orvil Arson Anderson, Second Lieut. Leland Stanford Andrews, Second Lieut. James Francis Armstrong, Second Lieut. Leslie Philip Arnold, Second Lieut. Melvin B. Asp.

Second Lieut. Raphael Baez, jr., Second Lieut. Joseph Popejoy Bailey, Second Lieut. Audrey Blaine Ballard, Second Lieut. Gerald Edgar Ballard, Second Lieut. Charles Yawkey Banfill, Second Lieut. John DeForest Barker, Second Lieut. Lloyd Barnett, Second Lieut. Carl Henry Barrett, First Lieut. Harold Arthur Bartron, Second Lieut. Lowell Whittier Bassett, Second Lieut. Eugene Cooper Batten, Second Lieut. Rosenham Beam, Second Lieut. Harold Webster Beaton, Second Lieut. Lucas Victor Beau, jr., Second Lieut. Levi L. Beery, Second Lieut. Dean Bryan Belt, Second Lieut. John William Benton, First Lieut. Victor Emile Bertrandias, Second Lieut. Cyrus Bettis, Second Lieut. John Beveridge, jr., Second Lieut. George Hendricks Beverley, First Lieut. Reuben Dalam Biggs, Second Lieut. Roland Birnn, First Lieut. Hugh Albert Bivins, Second Lieut. Lloyd Chartley Blackburn, Second Lieut. John Blaney, Second Lieut. Edwin Barton Bobzien, Second Lieut. Howard Zabriskie Bogert.

Second Lieut. Carlton Foster Bond, Second Lieut. Francis Pat Booker, Second Lieut. Elmer John Bowling, Second Lieut. William Lewis Boyd, Second Lieut. Harold Brand, Second Lieut. Howard Carlton Brandt, First Lieut. Charles Egbert Branshaw, Second Lieut. Charles Gage Brenneman, Second Lieut. Wendell Holzworth Brookley, Second Lieut. Thomas Brooks, Second Lieut. Norman Delroy Brophy, Second Lieut. Courtland Moshier Brown, Second Lieut. George Harold Brown, Second Lieut. Raymond Rudolph Brown, Second Lieut. Donald Lloyd Bruner, Second Lieut. George Howell Burgess, Second Lieut. Walter Kellsey Burgess, Second Lieut. Paul Edmund Burrows, Second Lieut. Henry Thomson Burtis, Second Lieut. Orin Jay Bushey.

Second Lieut. Roy William Camblin, Second Lieut. Dwight Joseph Canfield, Second Lieut. Edwin Forrest Carey, Second Lieut. Hjalmar Frithjof Carlson, Second Lieut. Earle J. Carpenter, Second Lieut. Harold Hibbard Carr, Second Lieut. Samuel Oliver Carter, Second Lieut. Warren Rice Carter, Second Lieut. Benjamin Suckles Cassadsy, Second Lieut. Bernard Tobias Castor, Second Lieut. Benjamin Shields Catlin, jr., Second Lieut. Homer Barron Chandler, Second Lieut. Charles Carl Chauncey, Second Lieut. Wilfred Morey Clare, Second Lieut. Harold Lyman Clark, Second Lieut. Willard Shaw Clark, Sargent Laurens Claude, Second Lieut. Ambrose Victor Clinton.

Second Lieut. James Culver Clack, Second Lieut. Gilbert Taylor Collar, Second Lieut. Harry Forest Collier, Second Lieut. William DeVoe Coney, First Lieut. Samuel Martin Connell, Second Lieut. William Edmund Connolly, Second Lieut. Frank Lauderdale Cook, Second Lieut. Russell Hay Cooper, Second Lieut. John D. Corkille, Second Lieut. Carl Anson Cover, Second Lieut. John Sanderson Crawford, Second Lieut. George Good Cressey, Second Lieut. Harrison Gage Crocker, Second Lieut. Robert Theodore Cronau, Second Lieut. Clarence Edgar Crumrine, Second Lieut. Charles Milton Cummings, Second Lieut. Wallace Caldwell Cummings, Second Lieut. James Thomas Curry, jr., Second Lieut. Clarence Meredith Cutler.

Second Lieut. Burnie Raymond Dallas, Second Lieut. Joseph Henry Davidson, Second Lieut. Rufus Benjamin Davidson, First Lieut. John Myrddin Davies, Second Lieut. Everett Sanford Davis, Second Lieut. Lewis Allegeo Dayton, First Lieut. William Windom Dixon, Second Lieut. James Harold Doolittle, Second Lieut. Charles Douglas, Second Lieut. Charles Hale Dowman, Second Lieut. Hugh Chester Downey, Second Lieut. John Raymond Drumm, First Lieut. James Edward Duke, jr., Second Lieut. Lionel H. Dunlap, First Lieut. Ray Aloysious Dunn, Second Lieut. Delmar Hall Dunton.

Second Lieut. John McDonough Early, Second Lieut. James Sharp Eldredge, Second Lieut. Carl Grammer Eliason, Second Lieut. Clifford Elleman, Second Lieut. Louis North Eller, Second Lieut. Charles Glendower Elliott, Second Lieut. Marion Larimora Elliott, First Lieut. Sam Love Ellis, Second Lieut. Arthur Ignatius Ennis, Second Lieut. Eugene Lowry Eubank, Second Lieut. Charles Reed Evans.

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The New Glenn L. Martin High Lift Wing

Among the problems confronting aeronautical engineers is that of producing an aerofoil which will permit a wider speed variation to be obtained and will at the same time give a greater efficiency of loading per square foot of area Progress in the solution of this problem has been made by the Dayton Wright Co in its variable camber wing, by the Parker variable camber wing, by the Gastambide-Levasseur variable surface aerofoil, and by the Handley Page new high lift wing Each of these four developments tends to solve the problem in different ways

Recently the Glenn L. Martin Co., Cleveland, Ohio, designed an airplane wing which it is claimed can lift a greater weight per square foot than any other wing yet produced At thirty miles per hour speed, a model only eighteen by three inches in size carried four and two-thirds pounds per square foot. This is twice as great as the lift of the famous R A F 15 wing, and 25 per cent more than that of the Handley Page high-lift wing according to the only recoed published. (In lbs/sq ft., m.p.h units, L_c=0 00516)

The efficiency of the Glenn L. Martin new high-lift wing at high speeds is said to be 10 to 15 per cent greater than the highest value ever recorded for any wing except the Parker variable camber aerofoil. It can not only carry great loads on planes of small dimensions, but for racing machines it is at the present time unequalled.

The "Glenn L. Martin Wing No 2" is thick, allowing a far more rugged internal construction than the thinner wings ordinarily used Part or all of the wing bracing may be built inside the wing, reducing the air resistance of the plane especially at high speeds.

Developement of Bomb Sights

The Ordnance Department has an organization at Frankfoed Arsenal which is concentrating on the development of bomb sights to be used in directing the flight of aircraft over a target which indicate the instant at which a bomb should be released in order that the target may be hit. It has developed a modification of the French Michelin sight which may be used with the bombs developed for use of the United States Army.

Further modifications are in progress and two sights will soon be produced which will combine the principles of the French Michelin sight with a new gyroscopic stabilizer The development testing of bomb sights is being undertaken at Aberdeen Proving Ground, Md., and exhaustive tests are in progress there on all available sights, both American and foreign, with the object of obtaining information which may assist in the further development of this type of material by the Ordnance Department.

A Letter

To the Editor of AVIATION —

There appeared in the issue for Aug 15, last, of this publication an article submitted by myself on the Resistance of Airship Models At the end there was added an editorial foot-note briefly stating that I claimed to have been the first to develop and use the correction for the static pressure gradient

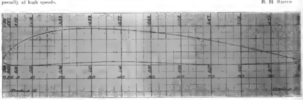
That the foot-note was unfortunately a misstatement of my claim must have been evident to most readers from the context of the article My claim is that I was the first to develop, and that this laboratory at the Washington Navy Yaed the first to employ the method of correcting for constant pressure gradients by means of Archimedes Principle for the buoyancy of fluids.

Correcting for a pressure gradient by this method involves nothing more than multiplying the model volume, already known, by the gradient constant. To one familiar with experimental aeronautics the advantage of this method, when it can be used, in saving time and precision, over the usual method of approximate integration over the model surface is at once evident.

The method was developed and the gradient constants for the Navy tunnel determined some weeks before Aug 26, 1919, which is the date of issue of the first report—No 135—of the Construction Dept., Navy Yard, Washington, D C., in which these constants were used. A report, No 148, covering the method was issued later dated Dec 29, 1919

I trust this meets Mr Wolker's objection whose letter I noted in a recent issue and similar objections that others may have taken to the foot-note.

R H SMITH



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